Exploring Crustal Material from a Mystery Planet

Suggested Grade Level: K – 12

Correlated Topics:

Rocks and Minerals	Oceanography, Lakes' and Streams
Geology	Volcanism
Meteorology	Sedimentation
Astronomy	Weathering and Erosion
Biology	Botany

Objectives:

Students will:

- Observe the characteristics of crustal material samples.
- Classify crustal material into groups with similar properties.
- Infer causes for the characteristics of the various crustal samples.
- Infer the history of the “mystery" planet.

Process(es) Illustrated:

Questioning	Observing
Hypothesizing	Classifying
Identifying variables	Inventing Concepts
Inferring	

Class of Activity: Exploratory: X Application: X Extension: X

Curriculum Connections: Language Arts

National Science Education Standards:

Standard A: Abilities necessary to do scientific inquiry

National Math Education Standards:

NM.5-8.8 Patterns and function

Materials Needed:

- Hand lens
- Toothpick and/or tweezers (optional)
- Sample "mystery" planet crustal material. Prepare a sample mixture of “typical” crustal material from a rocky planet. The exact composition is not critical, but include as many of the following as possible:
  - Coarse and fine sand, obtained from a playground, river, or beach

- Small rounded "pea" gravel pebbles, obtained from a steam or gravel pit
- Small flat "skipper" type round flat pebbles, obtained from a rocky lake or ocean beach (the flattening is caused by the wave motion at or near shore)
- Angular crushed stone, obtained from a rural road, driveway, or concrete (cement) mixing plant
- Table salt
- Coarse rock salt (sidewalk melting salt or crushed water softener pellets)
- Crushed clinkers from a coal furnace
- Vermiculite or pearlite, obtained from a garden shop
- Small fossil fragments or simulate by breaking shells into 1-cm pieces

- Any other rocky planet materials that you can obtain easily
- Metric graph paper to be used as a measuring device (mm or cm graph paper) as appropriate for the measuring skills of the student
- Large container, pail or pan, about 1-3 liter capacity (1-4 quart)

Procedures:

1. Give to each team two students a sheet of graph paper and a sample of crustal material. Be sure to include both large and small pieces.
2. Have the teams explore and observe as many properties and characteristics about each kind of substance they find. Remind students that they do NOT need to know what each substance is. Instead, lead them to describe the CHARACTERISTICS of the pieces, such as color, shape, size, shiny or dull, heavy or light, layers, mixed colors, flat or ball shaped, and any other properties they observe and can describe.
3. Have students share and discuss their observations.
4. Have students infer causes for the various characteristics of the materials. They might suggest volcanoes (cinders), water (sand and rounded pebbles), life (shell fragments), and many other cause-effect inferences.

Extensions:

1. Have students do library research to find out how various natural forces cause Earth features and then use inferences to apply these same forces to the "mystery planet".
2. Have students write or tell a story about the "mystery" planet.
3. Have the students write a paper about the environment on the "mystery" planet.

Credits:

Source of activity: "Exploring Crustal Material from a Mystery Planet" by D. Louis Finsand, ©1994 Project SPICA, President and Fellows of Harvard College, Cambridge, MA One of many activities in the available in the Project SPICA K-12 Teacher Resource Manual from Kendall/ Hunt Publishing Co., 4050 Westmark Dr., PO Box 1840, Dubuque, IA. 52004-1840. Additional information about obtaining prepared "mystery" planet crustal material and other Astronomy/ Earth Science materials can be obtained from the author by writing, to D. Louis Finsand, Spectrum House, 1501 W. 19th St. Cedar Falls, Iowa, 50613, Phone: (319) 273-2760.